Determination of bromine index of aromatic hydrocarbon

Sheet	**GT200-OF033E**		Petroleum
Method	**Polarization titration**		
Apparatus	Automatic Titrator Model GT-200 (GT0EF) Electrodes: Double platinum electrode (GTRE10B) *Optional unit 1) Analog pack PS board for polarization and conductivity (GTEPSK) 2) Cooling jacket for tall beaker	Related standard	ASTM 5776-07 Standard Test Method for Bromine Index of Aromatic Hydrocarbons by Electrometric Titration
Titration mode	INF, Detection: mV, Differential polarographic titration/IPOL, Applied voltage: 300mV		

※ *This application sheet is provided as reference, and does not assure the measurement results. Please consider analysis environment, external factors and sample nature for optimal conditions before the measurement.

Outline

A bromine number is a number which expresses the content of unsaturated components contained in petroleum or the like by the number of grams of bromine added to unsaturated components in a 100g sample (gBr_2/100g). A bromine index is an index which expresses 1 gBr_2/100g of a bromine number as a bromine index 1000, which corresponds to the number of milligrams of bromine added to unsaturated components.

Reagents

[Titrant]	■ 0.05mol/L (N/10)-bromine solution (Volumetric analysis grade/Commercial item)
[Titration solvent]	Mixture of 714ml of acetic acid (Special grade), 134ml of 1-Methyl-2-pyrrolidinone, 134ml of methanol and 18ml of sulfuric acid (Sulfuric acid:Water = 1:5)

Analytical procedure

[Blank measurement]

(1) Collect 150ml titration solvent using a measuring cylinder and add it into a 200ml tall beaker.
(2) Set the above-mentioned beaker in a cooling jacket and titrate with 0.05mol/L (N/10)-bromine solution while cooling the beaker down to 0-5 degrees C using a cold water circulation device or the like.

[Sample titration]

(1) Collect 30ml titration solvent using a measuring cylinder and add it into a 200ml tall beaker.
(2) Set the above-mentioned beaker on a balance and weigh out 20g of the sample.
(3) Collect 120ml titration solvent using a measuring cylinder and add it into the beaker.
(4) Set the above-mentioned beaker in a cooling jacket and titrate with 0.05mol/L (N/10)-bromine solution while cooling the beaker down to 0-5 degrees C using a cold water circulation device or the like.

[Calculation]

Bromine index = (A1 – BL) × K1 × 7990/S

A1: Titration volume of 0.05mol/L-bromine solution at sample titration (ml)
BL: Titration volume of 0.05mol/L-bromine solution at blank measurement (ml)
K1: Normality of bromine solution (0.1)
7990: Atomic weight of bromine (79.90) × 100. (Converted into the value per 100g)
S: Sample volume (g)

Other requirement

- Make sure to confirm labels and safety data sheets of reagents and gases used for the measurement and handle them with enough care.
- Wear protective equipment (eye protector, gloves and others) when handling reagents.
- Refer to the instruction manual of the analog pack polystyrene substrate for the setting method of applied current.
- When using a cooling jacket, put approximately 40ml of water in it as a medium. As titration is performed while cooling the water down to 0-5 degrees C, prepare a cold water circulation device or the like separately.

Measurement results

	Sample size (g)	Titration volume (ml)	Bromine index
1	20.2574	5.3614	210.6
2	20.0714	5.2426	207.8
3	20.5043	5.3615	208.1

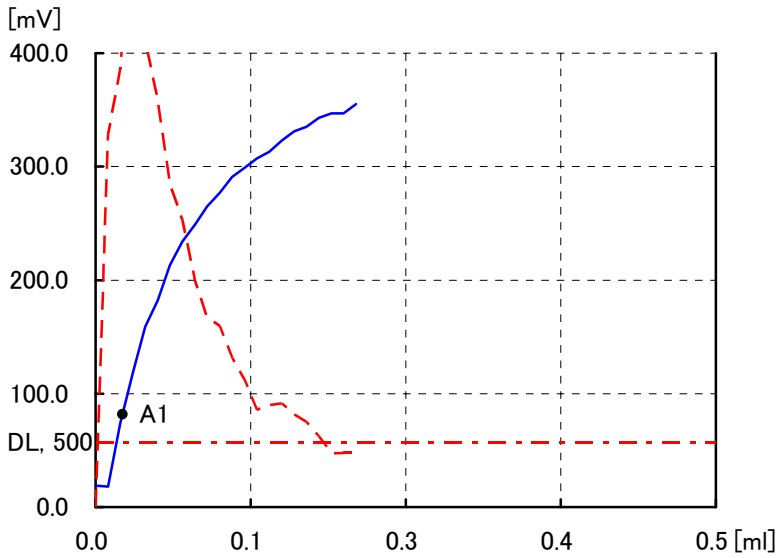
Blank : 0.0218ml

Nos. of data	(n)	3
Average		208.8
Standard deviation	(SD)	1.54
Relative standard deviation	(RSD%)	0.74

Bromine indexes of aromatic hydrocarbon were measured using GT-200. The average of three measurements was 208.8 and the relative standard deviation (RSD %) was 0.74%. GT-200 can measure bromine indexes with good repeatability.

ID No. : 6 GT No.1 User : GT-200

Measurement : 2015/05/08 14:06 Type : Sample Titr
Sample name : Titration solvent 150ml Sample size (S) : 150 [ml]



C1 : 0.0218 [ml]

A1 : 0.0218 [ml] 82 [mV]

Initial potential (Pi) : 19 [mV]
Start : 0 [ml] 19 [mV]
End : 0.21 [ml] 355 [mV] Time : 2'39"

Run file No. : 5 Bromine index
Titration filr No. : 9 Blank of Bromine index *Run file and Titration file parameters are set for each analysis item

Mode : INF End1, End1 Width : 100 [mV] ± 100 [mV]
Detect : mV(P)
BRT No. : 1
Reagent : 35
WTint : 10 [sec]
Vup : 10 [µl]
Vlow : 10 [µl]
dE : 3 [mV]
dT : 5 [sec]
DL : 500 [mV/ml]
DetCnt : 3
Vmax : 5 [ml]
Vover : 0.1 [ml] C1 : A1

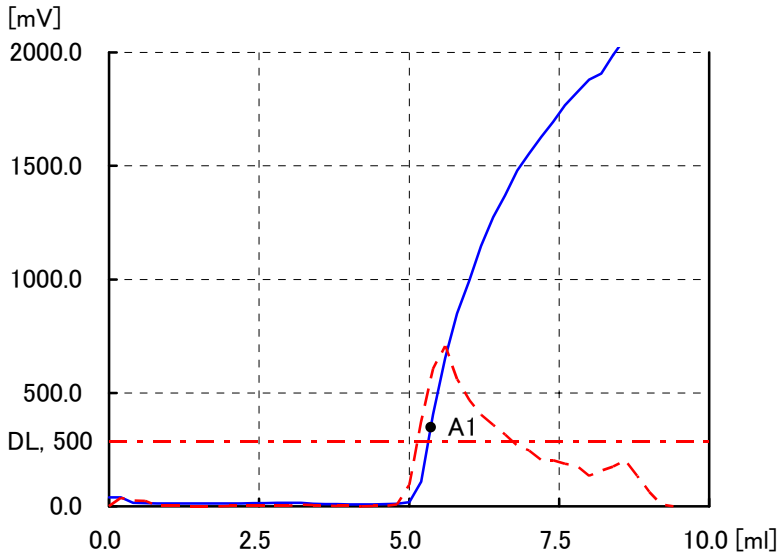
[ml]

Reagent name (Reag) : Bromine solution Equivalent (E) : 2 Molarity (M) : 0.05 [Mol/l]
Factor (f) : 1.005

Buret Injection Speed : 500 [ul/sec]

Measurement : 2015/05/08 11:52
Sample name : Test sample

Type : Sample Titr
Sample size (S) : 20.2574 [g]



C1 : 210.607 [mgBr2/100g]

A1 : 5.3614 [ml] 348 [mV]

Initial potential (Pi) :	40	[mV]			
Start :	0	[ml]	40	[mV]	
End :	9.4	[ml]	2130	[mV]	Time : 9’ 0”

Run file No. : 5 Bromine index
Titration file No. : 5 Bromine index

*Run file and Titration file parameters are set for each analysis item

Mode	: INF		
Detect	: mV(P)		
BRT No.	: 1		
Reagent	: 35		
WTint	: 10	[sec]	
Vup	: 200	[µl]	
Vlow	: 200	[µl]	
dE	: 3	[mV]	
dT	: 5	[sec]	
DL	: 500	[mV/ml]	
DetCnt	: 6		
Vmax	: 100	[ml]	
Vover	: 1	[ml]	

End1, End1 Width : 500 [mV] ± 500 [mV]

C1 : (A1-BL)*K1*7990/S

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Reagent name (Reag) : Bromine solution
Factor (f) : 1.005

Equivalent (E) : 2
Blank (BL) : 0.0218 [ml]

Molarity (M) : 0.05 [Mol/l]
Coefficient1(K1) : 0.1

Buret Injection Speed : 500 [ul/sec]